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Requirements for an "Ideal" Drug for Preventing Space Motion Sickness

907C0483A Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian
Vol 23 No 6, Nov-Dec 89 (manuscript received
15 Mar 89) pp 33-36

[Article by N.N. Karkishchenko]

[Text] The imperfect state of medicinal protection against space motion sickness (SMS) is largely due to insufficient study of the mechanisms underlying this syndrome and the lack of theoretical approaches that could be used to formulate the property requirements of an "ideal" drug and produce highly effective prescriptions. The existing pharmacological methods that include the use of cholinolytics, histamine- and dopamine-blocking agents, psychostimulants, GABA-mimetics, and opiate receptor antagonists [11, 12] are insufficiently effective. The action of these agents is chiefly aimed at suppressing the central links of vestibular reflexes by acting upon the chemoreceptor trigger zone and vestibular nuclei. However, the onset of intensive vestibular-autonomic disturbances (VAD) during motion sickness is associated with the generalized propagation of stimulation along CNS structures that originates from the vestibular apparatus [5]. In this connection, the use of anti-epileptic agents that affect the intercentral reciprocal relationships in the CNS to restrict such stimulation may be quite promising. At the same time, the generalized propagation of stimulation along the CNS structures during which typical SMS disturbances occur in the sensory, motor, and autonomic areas is a result of the excessively pronounced vestibular asymmetry that occurs in microgravitation [3]. The use of adaptive agents that stimulate the synthesis of nucleic acids and protein and that activate energy metabolism must be conducive to the formation of adaptive changes in vestibular analyzer function and asymmetry compensation.

This research was undertaken with the purpose of identifying and substantiating the range of effects and action mechanisms of drugs that might be used to produce a powerful, low-toxic drug to prevent SMS.

Method

Participating in our investigation were 179 healthy male volunteers aged 19 to 26 years with lowered vestibular stability. Motion sickness was simulated by method [1]. Rotation was continued until the appearance of VAD degrees II-III in the test subject. The appearance of retching or vomiting served as a signal to halt the vestibular stimulation. A single and full course administration of drugs (orally) was undertaken by the double blind method employing placebo as well as scopolamine at a dose of 1 mg as the standard. The anti-motion sickness effectiveness of the drugs was evaluated by the change in the length of time the test subject could

tolerate the vestibular test, the dynamics of motion sickness clinical symptoms [2], and the degree to which the pulse rate (employing a RV-01 rhythmovasometer) and EEG spectral characteristics [4] (employing a program complex based on the Elektronika-100I computer) changed. The state of mental fitness was tested by the use of the "missed digit method" computer test [6] on a CM-4 computer.

The test results were statistically processed by the Wilcoxon paired criterion method.

Results and Discussion

A single administration of diphenine and depakene [sodium valproate] and a full course administration of potassium orotate and pyracetam resulted in a longer tolerance of the vestibular test that was significantly more pronounced than with the use of scopolamine (see Table). The anti-motion sickness effect of these agents was also characterized by a more rapid reduction in VAD symptoms and less pronounced changes in the pulse rate and EEG spectral characteristic values (total output of spectral EG components of the parietooccipital leads was in the range of 8-10 Hz) in comparison to the effects of the primary modeling of motion sickness.

The mechanisms underlying the protective effect of potassium orotate might not only be associated with the induced synthesis of nucleic acids, but also with the accumulation of GABA in the brain tissue and the reduction of glutamate content [10]. An important role might also be played by the interaction between antiepileptic agents and neuroactive amino acids where diphenine and depakene activate GABA-ergic systems and depress glutamate- and aspartate-ergic systems [8, 14, 15, 17], where depakene inhibits glycine metabolism, and where glycine and stimulant amino acids influence the release of acetylcholine [8]. The action of diphenine and depakene may also be associated with the GABA-ergic neuron-mediated depressive effect that these substances have on the B-endorphin system of the hypothalamus [16] (there is evidence that this peptide is important in the onset of VAD in motion sickness [12]).

Effect of Drugs on Tolerance Duration of Vestibular Test (M+/-m)

Drug Administered	Duration of Vestibular Test Tolerance, s		2/1, %
	Background (1)	After Administration of Drug (2)	
Placebo	118.3+/-10.7	123.3+/-11.3	104.2+/-9.6
Scopolamine	136.1+/-9.2	167.8+/-10.0**	123.3+/-7.3
Diphenine (200 mg)	123.2+/-11.9	187.8+/-22.3*	146.3+/-17.4
Diphenine (300 mg)	104.4+/-16.0	170.0+/-28.3**	162.8+/-27.1
Placebo	144.1+/-7.8	153.2+/-7.6	106.5+/-5.3
Scopolamine	139.3+/-8.2	162.7+/-11.4*	116.8+/-8.2

Effect of Drugs on Tolerance Duration of Vestibular Test (M+/-m) (Continued)

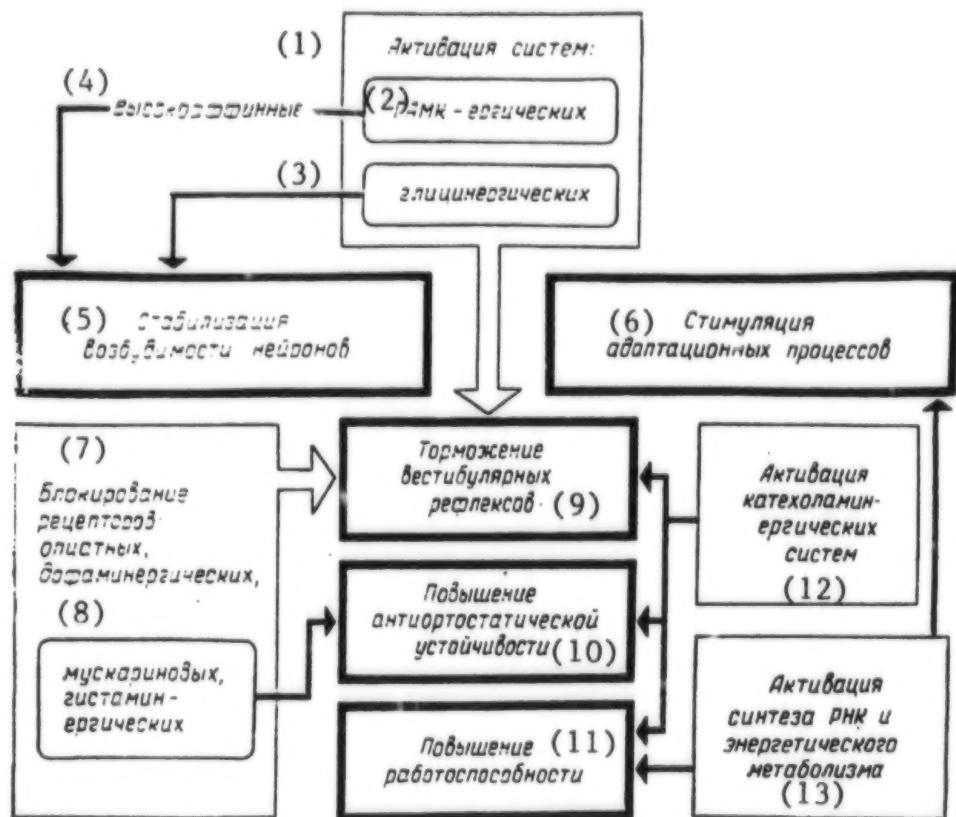
Drug Administered	Duration of Vestibular Test Tolerance, s		2/1, %
Dekapene (300 mg)	99.1+/-9.6	131.7+/-18.7	132.9+/-18.7
Dekapene (450 mg)	99.3+/-12.0	166.4+/-17.3*	167.6+/-17.5
Placebo	112.5+/-8.2	115.0+/-9.4	102.2+/-8.4
Scopolamine	120.5+/-11.5	144.5+/-12.6*	119.8+/-10.5
Pantogam (1000 mg)	118.8+/-13.2	133.1+/-26.9	112.1+/-22.6
Pantogam (1500 mg)	116.9+/-19.9	141.9+/-18.5	121.4+/-15.9
Placebo	143.8+/-17.6	171.3+/-13.6	119.2+/-9.4
Scopolamine	135.6+/-6.7	149.4+/-22.4	110.2+/-16.5
Potassium orotate:			
5-7 days	130.0+/-18.8	131.3+/-13.2	101.0+/-10.1
12-14 days	97.5+/-15.8	239.5+/-44.5**	245.6+/-45.6

Effect of Drugs on Tolerance Duration of Vestibular Test (M+/-m) (Continued)

Drug Administered	Duration of Vestibular Test Tolerance, s		2/1, %
Placebo	125.9+/-17.8	138.4+/-16.5	109.9+/-13.1
Scopolamine	128.5+/-15.9	161.8+/-22.7**	125.9+/-17.6
Pyracetam (2000 mg):			
single administration	120.0+/-22.0	230.0+/-57.7	191.7+/-48.1
3 days	105.0+/-12.4	212.5+/-40.4*	202.4+/-38.5
7 days	127.9+/-16.4	280.8+/-46.1**	219.5+/-36.0
14 days	104.5+/-13.3	144.5+/-26.1**	138.3+/-5.0

Note: Full course administration of preparations: three oral doses comprised potassium orotate at a daily dose of 40 mg/1 kg of body weight; Pyracetam at a daily dose of 30 mg/1 kg. One asterisk denotes $p < 0.05$, two asterisks denote $p < 0.01$.

At the same time GABA, glutamate, glycine, and endogenous agonists of opiate receptors as well as acetylcholine take part in processing information about body

**Effects and mechanisms of an "ideal" drug for preventing space motion sickness.**

Key: 1. Activation of systems; 2. GABA-ergic; 3. Glycine-ergic; 4. High affinity; 5. Stabilization of neuron excitability; 6. Stimulation of adaptive processes; 7. Receptor blockage: of opiates, dopamine-ergic; 8. Muscarines, histamine-ergics; 9. Inhibition of vestibular reflexes; 10. Elevated antiorthostatic stability; 11. Heightened efficiency; 12. Activation of catecholamine-ergic systems; 13. Activation of RNA synthesis and energy metabolism

movements in space at the vestibular nuclei level [7, 9, 13]. The effect on opiate and dopamine- and histamine-ergic mechanisms may be important for suppressing the emetic reflex. In addition to the indicated effects as well as the inhibitory effect on vestibular reflexes, the "ideal" preventative against space motion sickness must have two other properties: the ability to increase antiorthostatic stability and the ability to improve mental and physical efficiency. When the most effective drugs were taken in combined form (see Table) we detected a strong adjusting effect on the status of mental efficiency which was evaluated by the "missing digit" test.

In summing up the test results and literature data, the effects and mechanisms underlying the action of an "ideal" drug to prevent space motion sickness can be represented in a diagram form.

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Effect of Single Impacts of Heavy Ions of Galactic Cosmic Rays on *Lactuca sativa* Seeds Exposed on Salyut-6 and Salyut-7 Stations

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[Article by L.V. Nevzgodina, Ye.N. Maksimova, and Ye.V. Kaminskaya]

[Text] In spite of the comparatively low doses of total ionizing radiation (on the order of 0.002—0.03 gram-roentgens) received during the Kosmos, Apollo, and Soyuz flights, radiation alterations did take place in biological test objects.

Such changes can be induced by protons and gamma rays at doses of 10^2 or 10^3 higher than the doses received in flight [8]. Therefore, the results of the space flight experiments cannot easily be associated with protons. It would seem more probable that the observed alterations are associated with the passage of some heavy ions (HI) of galactic cosmic rays (GCR) through the biological object. Calculations have shown that when HI pass through biological tissue in a 2—20 nm radius track area, the energy released is equivalent to a dose of several hundred rads [4]. Inasmuch as the HI energy transfer is markedly localized, the observed effects may result from the impact of these particles in the region of certain sensitive cellular structures.

Although experiments on the Bioblok-1 (Kosmos-936) and Bioblok-4 (Kosmos-1129) satellites as well as on the Biostek-I and Biostek-II (Apollo-16 and -17), and Biostek-III (Soyuz-Apollo) satellites conducted on Antemia salina brine shrimp eggs, *Lactuca sativa* lettuce seeds, *Bacillus subtilis* microorganisms, and some other biological test objects were only partially correlated with HI impacts, those experiments yielded results that were not always quantitatively well-defined. However, they did

confirm the presence of a cosmic ray heavy component. In a number of cases similar effects were also noted in biological objects untouched by HI [9]. Those effects may have been caused by $Z < 6$ particles, delta-electrons, etc., that were not recorded by detectors, or by nuclear interactions of neutrons, or by supplemental effects of weightlessness, vibration, acceleration, etc. Some believe that weightlessness does not alter gene and chromosomal mutations [2]. Experiments conducted on air-dried seeds exposed on the artificial earth satellite (AES) Kosmos-1129 for 20 days (Bioblok-4) and on Kosmos-1514 for seven days (Bioblok-5) confirm that assumption. No aberrant cell increase in size was detected in the seeds untouched by HI, regardless of the flight's duration. Over a 20-day flight the percentage of aberrant cells in the HI-affected seeds increased by more than two times in comparison with the control and seeds untouched by HI. There was a relationship between the yield of aberrant cells and the HI localization in the seed. The greatest percentage of aberrant cells occurred when part of the impact was on the root meristem and the smallest percentages occurred next to the meristem when HI entered the cotyledon [7].

During the brief space flights of the Kosmos-782 and -936 AES, statistically reliable data on the relationship between the resultant effect and HI impact were difficult to obtain because the small fluence value (4.5 particles per 1 cm^2 for particles with $Z >= 6$ and a linear energy loss (LEL) $>= 200 \text{ keV}/\mu\text{m}$).

In flights of one year or more the probability of HI impact goes all the way up to iron ions.

The purpose of this study was to study the effect of single HI of GCR during extensive flights on the orbiting manned stations (OMS) Salyut-6 and Salyut-7. Air-dried *Lactuca sativa* lettuce seeds were employed as the biological test object in our experiments.

Method

Air-dried *Lactuca sativa* lettuce seeds were exposed on the Salyut-6 orbiting manned station ("Integral" experiment) for 66 days and 123 days, and on the Salyut-7 ("Bioblok-3" experiment) for 40, 201, and 457 days. All of the test set-ups in these experiments were in the living compartment of the ship, i.e., under controlled conditions.

The biotest setup comprised layers of "monolayer" seeds alternating with physical detectors for recording HI tracks. Furthermore, nitrate cellulose detectors recorded HI with a charge of $Z >= 6$ and LEL $>= 200 \text{ keV}/\mu\text{m}$. The biotest setup was dismounted after the completion of the flight and return to earth. The detectors were soaked in an alkaline solution in order to identify the HI tracks. The detectors were collected into the assembly in the same coordinate system as was used during exposure in order to check for errors. The biotest objects hit by the heavy particles were recorded during the same checkout of the layer with the biotest objects and detectors [5]. A.M. Marenny et al. measured the flow density of the

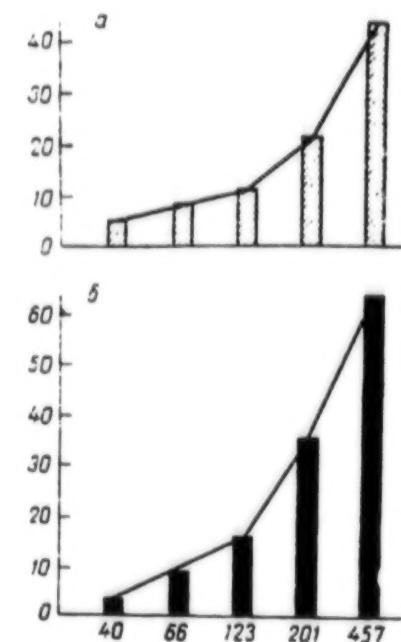


Figure 1. Change in the magnitude of fluence (a) and dose (b) during seed exposure on the Salyut-6 and Salyut-7 manned satellites. X-axis represents duration of exposure (in days); Y-axis represents: a - fluence (number of particles per 1 cm^2); b - dose (in mGr).

heavy nuclei and fluence and identified the seeds impacted by HI [6]. Dosimetry of the test objects was accomplished with thermoluminescent detectors employed in flight experiments and for individual dose control on the space ships Soyuz - Salyut. Yu.A. Akatov and colleagues recorded the integral absorption dose [10].

Two weeks after returning to earth, all the varieties of seeds were moistened in tap water and cultivated in Petri dishes. One day after seeds were hydrated and during subsequent days, dependent upon their germination, the seedlings were fixed in an acetalcohol mixture (1:3), dyed with acetorcein, and cytogenetically analyzed during the first mitosis. The germination energy (on the third day) and the germinating capacity of the seeds (on the seventh day) were also recorded. The effect was evaluated by the yield of cells with different chromosomal rearrangements during anaphase and telophase. The following versions of seeds were employed in the experiment: airborne seeds impacted by HI, seeds untouched by HI, and control seeds.

Results and Discussion

The dosimetric results presented in Figure 1 showed that fluence value (number of particles per 1 cm^2) and dose (in mGr) increased as the duration of the flight increased from 40 to 457 days.

A certain delay in germination, especially among the seeds impacted by HI, was observed during the germination of the air-borne group of seeds. These observations held true for all stages of the flight. A reduction in the germination energy of the seeds three days after they were moistened was clearly seen in the Bioblok-3 experiment. However, on the seventh day the differences between the flight and control versions disappeared (Fig. 2). A cytogenetic analysis of the flight version seeds revealed an increase in the yield of aberrant cells regardless of the length of exposure in space in comparison to the control seeds (see Table). Moreover, the greatest increase of aberrant cells was noted in the seeds impacted by HI. A slight, although insignificant increase in the yield of aberrant cells was also noted in the control seeds. This was related to the natural aging of the seeds (seeds from a single batch were used in the experiment). The greatest yield of cells with multiple chromosome fractures was also observed among the seeds impacted by HI over a flight duration time of 201 and 457 days. Such fractures were observed to a significantly lesser degree (two to three times less) among the untouched air-borne seeds, and to an even lesser degree among the control seeds. The number of aberrations per aberrant cell varied on the average in a similar manner for all of the examined seeds.

There was a clear linear relationship between the resultant HI effects and the absorption dose magnitude (Fig. 3). This relates both to the total number of aberrant cells as well as to the cells with multiple chromosomal fractures. The greatest increase in the yield of aberrant cells was observed in the air-borne seeds irradiated with a dose of 63.4 mGr. A similar increase occurred when the seeds were irradiated by gamma-quanta and protons (630 MeV) at doses of 10 and 5 Gr, respectively. The resultant data indicate the much greater biological effectiveness of heavy nuclei than may have been expected. This is due to the low levels of absorbed HI doses and fluences. One should also note the identical character of the curves (incline angles are close or equal in value) for the relationship between the total number of aberrant cells and dose for the seeds affected and unaffected by heavy nuclei. One cannot say the same for the relationship curves for cells with multiple chromosomal aberrations. In the dose range of 16 - 63.4 mGr the magnitude of the slope for HI-affected seeds was greater than that for the unaffected seeds. This indicates that the frequency of multiple injuries induced by the direct impact of HI with a higher charge increases proportionately to the duration of the flight (in the Bioblok-3 experiment only HI with a charge of $Z > 16$ were counted in flight times of 201 and 457 days).

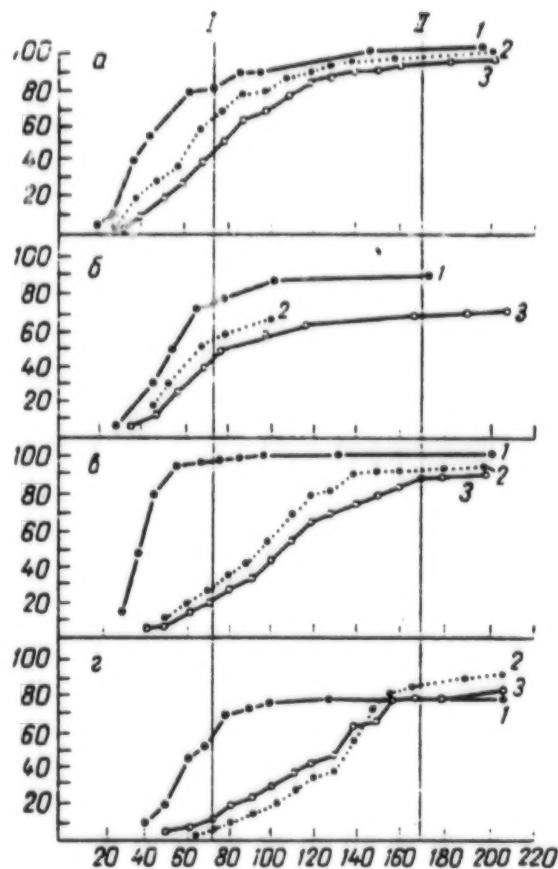


Figure 2. Dynamics of "monolayer" seed germination during exposure in space for 40 days (a), 66 days (b), 201 days (c), 457 days (d). X-axis represents germination time (in hours); Y-axis represents germinating capacity (in percent). I - 3rd day, II - 7th day. 1 - control; 2 - seeds untouched by HI; 3 - seeds impacted by HI.

Thus, the data obtained from our experiments attest to statistically reliable differences in the yield of the total number of aberrant cells and cells with multiple chromosomal fractures between the affected and unaffected seeds in the 16 - 63.4 mGr range. The results also yield data on the variable dynamics in the growth of the total number of aberrant cells and cells with multiple chromosomal fractures that is possibly related to the impact of HI with a charge $Z > 16$.

The study of *Bacillus subtilis* [11] established a connection between biological effect (in the linear energy loss range of 1.5 - 5.5 GeV/cm²g and $Z=13-28$) and Z , or more likely Z^2 , than the linear energy loss of the particles.

Cytogenetic Analysis of Lettuce Seeds Following Exposure on the Orbiting Manned Salyut-6 and Salyut-7 Satellites

Exposure time, days	Group	Number of seeds	Total number of aberrant cells, %	Cells with multiple aberrations, %	Number of aberrations per aberrant cell
40	Control	54	2.23+-0.23	0.23+-0.08	1.10
	Flight - background	310	4.20+-0.13	0.31+-0.04	1.09
	Flight - HI	267	4.28+-0.12	0.50+-0.04	1.06
66	Control	33	1.66+-0.32	0	1.00
	Flight - background	31	1.77+-0.37	0.07+-0.07	1.04
	Flight - HI	40	3.80+-0.44	0.26+-0.12	1.07
123	Control	20	2.00+-0.55	0	1.00
	Flight - background	125	3.21+-0.35	0.15+-0.08	1.06
	Flight - HI	62	4.97+-0.55	0.26+-0.13	1.13
201	Control	120	3.94+-0.28	0.32+-0.08	1.11
	Flight - background	230	5.56+-0.39	0.50+-0.12	1.09
	Flight - HI	534	8.40+-0.25	1.40+-0.11	1.25
457	Control	48	4.90+-0.76	0.61+-0.27	1.12
	Flight - background	75	12.52+-1.21	1.22+-0.40	1.11
	Flight - HI	169	15.15+-0.87	2.61+-0.39	1.23

There are a number of indications in the literature that the mutagenic activity of primary cosmic radiation is greater than X-ray irradiation. In the study by Eugster and Simons [12], the genetic consequences (color mutations of barley grains) are associated with single HI impacts. Interesting observations were made of corn seeds exposed on board the ASTP [14]. Many of the shoots exhibited large yellow bands (more than 1 cm wide), whereas no such anomalies were observed in the control group. The authors claim that such pronounced anomalies were never observed previously either in space or in terrestrial experiments with HI. A detailed examination of the adjacent plastic detectors indicated the presence of two HI entry points into the central embryo area of particles with an LEL of approximately 100 - 150 keV/ μ m and Z>=20. Some galactic cosmic ray heavy nuclei proved to be lethal when they hit *Arabidopsis thaliana* seeds [1]. These effects are associated with injury to a large number of cells in various regions near the meristem bud that resulted from the passage of dense ionizing tracks. One should note that the massive destruction of seeds exposed to γ -irradiation was observed at doses of the order of 1500 - 2000 Gr. In addition, there were plants with five-leaf lilac-yellow colored rosette without any signs of root development. Analogous anomalies occurred when two HI hit the areas near the root meristem in *Lactuca sativa* lettuce seeds, i.e., the formation of plantules with two very underdeveloped rootlets. A cytogenetic analysis of these rootlets detected a few cells capable of fission [9].

Thus, the data we have cited convincingly demonstrated that the exhibited effects resulted from the direct impact of several galactic cosmic ray heavy nuclei. However, both in our investigations and those of others [13] similar effects have been noted in objects untouched by HI. The possible reason for these changes might be

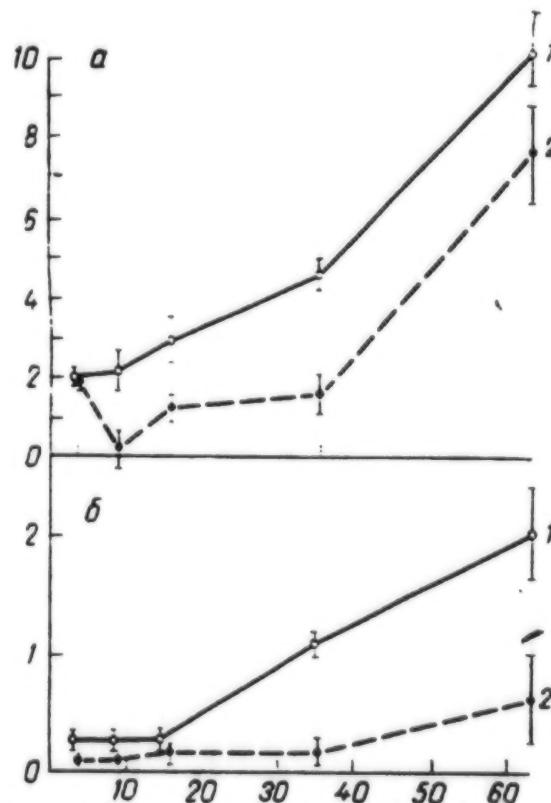


Figure 3. Frequency of aberrant cells (a) and cells with multiple aberrations (b) minus the spontaneous level of mutations in lettuce seeds in relation to the absorbed dose. X-axes represent the dose (in mGr). Y-axes represent a - aberrant cells (in percent), b - cells with multiple aberrations (in percent). 1 - seeds impacted by HI; 2 - seeds untouched by HI.

negligible particles with $Z > 16$ as well as non-ionization effects [11]. In the experiments on *Artemia salina* cysts [15] anomalies were observed in the development of eggs that were not injured but located close to the HI tracks. One of the probably reasons for the observed effects might be the acoustic and shock waves that are formed during abrupt heating and the changes in the aggregate state of a substance in the track of a charged particle [3]. In that connection, further study would be most desirable to examine the effect of multi-charged ions (on an accelerator) with previously known physical parameters of the impact particles and under controlled conditions as well as study of the non-ionization mechanisms underlying the formation of the primary radiobiological effect.

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AIDS Discovered Accidentally in Foreign Students

907C0060A Kiev RADYANSKA UKRAYINA
in Ukrainian 8 Sep 89 p 4

[Article by Department Head, ZORYA POL-TAVSHCHNY newspaper, G. Grin, under the rubric "Extreme Situation": "Diagnosis: AIDS"; the article has a dateline of Poltava, September 7; the interview that is included was conducted by telephone]

[Text] Is it conceivable that a patient who has been diagnosed for AIDS today will be discharged from a hospital tomorrow?

It is inconceivable, but here are the facts: on July 14, 1989, the AIDS virus was for the second time found in the blood of Doambo Eme, a student from the Republic Bourkina Faso enrolled at the Kremenchug Civil Aviation School (the first positive result was obtained in a lab analysis by the city blood transfusion office on July 7). And on July 15 he was already discharged. The patient returned to hotel "Kremen," where he and his compatriots stay. They have come to the city along the Dnieper, according to a reference from the All-Union Cost-Accounting Foreign Economic Association "Aviaekspor" and the company "Aviatekhservis."

The group of Bourkina Faso citizens arrived at Kremenchug for classes on June 10. The day before, they were in Moscow, where they had to undergo a mandatory AIDS test. But... Here is how V. O. Korshenko, an oblast sanitary and epidemiology office physician in charge of AIDS supervision, described the situation:

"In Moscow the group was not tested for AIDS. Nor was it done in Kremenchug. On June 29 Doambo Eme was hospitalized at the 2nd City Hospital with nephritis. The same day, his blood sample was drawn for the enzyme immunoassay—the EIA. Results of two tests were positive. On July 15 a third blood sample was drawn, and on the evening of July 16 it was sent to the Problem Laboratory of the Kiev Scientific Research Institute of Epidemiology of Infectious Diseases. Kiev confirmed the diagnosis, but according to the regulations the Central Scientific Research Institute of Epidemiology, USSR Ministry of Health, has the last word. On August 4, a telegram arrived from Moscow; it confirmed that, yes, there is AIDS in Kremenchug."

In the meantime, the sick man had been staying in the hotel and had contacts with the hotel staff, tourists from various cities in our country, and foreign tourists. He might even have had sexual intercourse. He had not been isolated at the 2nd City Hospital, either.

Only after the telegram from Moscow arrived, were competent city and oblast commissions organized. At their request, the entire Bourkina Faso group was subjected to a comprehensive checkup. The result was

astonishing—the AIDS virus was detected in the blood of three more people. All four were sent to Moscow for hospitalization.

That is the story in a nutshell. We can only add that this extraordinary event gave rise to numerous rumors and gossip in the city and oblast. As early as August 24, a meeting of the Kremenchug Executive Committee of the City Council of Peoples Deputies took place. The manager of the Medical Sanitary Division of the Civil Aviation School V. M. Chernichok, epidemiologist Yu. V. Talnitskiy, and the assistant school commander in charge of foreign student affairs V. V. Studenitskiy were fired. Strict penalties were imposed on school commander P. S. Kondratenko, chief physicians of the 2nd City Hospital and City Blood Transfusion Station I. I. Bonchuk and V. V. Zinov'yeva, and a number of other officials who had demonstrated exceptional apathy and negligence. City internal affairs agencies are conducting a search for promiscuous women who might have had contacts with the infected foreigners (and one is under suspicion). So, there still is a dangerous possibility that imported AIDS can get a Kremenchug passport.

AIDS Testing Lab in Kiev

907C0060B Kiev RADYANSKA UKRAYINA
in Ukrainian 13 Sep 89 p 4

[Interview by Ye. Krasnovskiy, under the rubric "Urgent Interview": "Kiev: AIDS Is Detected"; first paragraph is RADYANSKA UKRAYINA introduction]

[Text] The AIDS testing office at the Kiev Scientific Research Institute of Epidemiology of Infectious Diseases imeni L. V. Gromashevskiy has been operating for two years in the Ukrainian capital (Vorovskaya Street, 20). Our correspondent interviewed an infectious disease specialist from the institute, O. P. Purik.

Krasnovskiy: Tell us, please, about the results of your work.

Purik: Our office is the first of its kind in the Ukraine. Since we began operating, we have checked 7,000 people. Most of them are Kievites, but we have also had people in from other cities of our Republic. We have also checked foreigners from two Kiev higher institutes of learning.

Krasnovskiy: And?

Purik: Up until now everything has been OK. But recently we found two AIDS-stricken patients.

Krasnovskiy: Foreigners?

Purik: No. Both are Kievites, and both are young women. We guard patients' secrets, so we did not attempt to extract theirs. But it is absolutely clear—they got sick as a result of "free" sexual contact. What forces people to turn to us? Sometimes it is their excessive suspiciousness, but most of the time it is their fear for the possible consequences of their sins.

Krasnovskiy: What will be the fate of the two women?

Purik: They will undergo medical treatment, either at our Institute or in Moscow. But you certainly understand that all in all their fate is unenviable. This is why I would again like to tell everybody: there is no effective medicine for curing AIDS victims yet. Therefore, the main guarantee of preventing AIDS lies in a person's behavior and healthy way of life. I would like to inform the readers of our new schedule. We are open Monday, Wednesday and Friday from 1 p.m. to 7 p.m., and Tuesday, Thursday and Saturday from 8 a.m. to 2 p.m.

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Seroprevalence Study, Forecast of AIDS in USSR
907C0512A Moscow TERAPEVTICHESKIY ARKHIV
in Russian Vol 61 No 11, Nov 89 pp 3-6

[Article by V.I. Pokrovskiy: "HIV - Infection or AIDS?"]

[Excerpts] The global human immunodeficiency virus (HIV) infection rate continues to increase rapidly. According to WHO data as of June 1, 1989, there were 167,373 cases of persons with a pronounced clinical picture of the disease which has come to be called acquired immunodeficiency disease syndrome—AIDS. The number of HIV-infected persons is between 10 to 15 million. This infection has been recorded in 148 countries of the world. About 6,000 new cases and one additional country in which AIDS cases are detected are being recorded each month.

There were 323 HIV seropositive citizens of the USSR as of August 18, 1989. Of that number, 14 were diagnosed as AIDS cases (seven of whom have died). As of the same period there were 409 HIV seropositive foreign citizens who were examined in connection with their arrival in the USSR.

Whereas prior to 1985 AIDS and HIV infections were considered to be most prevalent among homosexuals, drug addicts, hemophiliacs, and persons engaged in promiscuous relationships with a large number of partners, today there is practically no group of the population for which the possibility of HIV infection can be excluded.

The Table presents results for HIV antibody testing of the USSR population from January 1, 1988 to March 31, 1989 as tabulated at the USSR Ministry of Health Central Scientific-Research Institute of Epidemiology. Those results indicate that HIV infections in the USSR were still rather rare in 1988. This is convincingly demonstrated by the very low infection rate among blood donors and pregnant women. However, the percentage of infection among the so-called risk groups was significantly higher.

Heterosexual transmission has been the most predominant mode of transmission in the USSR (27.3 percent of the infectious cases) both from men to women (66.7 percent) and from women to men (33.3 percent). Parenteral intervention accounted for a significant portion of infection (25.8 percent). In third place was transmission among homosexuals (22.7 percent). Infections resulting from blood transfusions (11 cases; 5.7 percent) occurred only prior to 1988. The large number of infected women accounted for the relatively large percentage of infection among the newborn (5.2 percent).

Noteworthy is the fact that sexually transmitted HIV infections were relatively more frequent in the large cities, such as Moscow, Leningrad, Odessa, Minsk, Kiev, etc.

Thus, in spite of the relatively low HIV infection rate in the USSR population, we now have the beginnings of an epidemic which, in the absence of effective preventive and anti-epidemic measures, threatens to become a national catastrophe.

According to mathematical projections on the HIV epidemic in the USSR as calculated at the Scientific-Research Institute of Experimental Medicine im. N.F. Gamaleya, by the year 2000 we can expect to have over 30,000 AIDS cases and 1,045,000 cases of infection.

Many infectious (influenza, meningitis, salmonella, hepatitis, etc.) and non-infectious (oncological, cardiovascular, endocrine) diseases that have been long been known to humankind today have morbidity and mortality rates that are much higher than HIV infections. One must ask, in that connection, whether or not our society is giving adequate attention to HIV infections. The answer is clear: we are still giving inadequate attention to the control of HIV infection.

HIV Antibody Test Results for the USSR Population From January 1, 1988 to March 31, 1989

Contingent of examined persons	Number of examined persons	Number of seropositive persons in immuno-enzyme test		Number of seropositive persons in immune blot test	
		abs.	%	abs.	%
USSR citizens	24,378,551	5115	0.02	159	0.0007
Persons identified in the course of an epidemiological investigation	3,577	128	3.58	100	2.79
Drug addicts	170,934	40	0.02	0	0
Homosexuals and bisexuals	23,718	14	0.06	2	0.00843

HIV Antibody Test Results for the USSR Population From January 1, 1988 to March 31, 1989 (Continued)

Contingent of examined persons	Number of examined persons	Number of seropositive persons in immuno-enzyme test		Number of seropositive persons in immune blot test	
Persons with venereal diseases	531,432	245	0.05	17	0.00320
Persons engaging in numerous promiscuous sexual relationships	241,429	70	0.03	0	0
Persons who have spent more than one month abroad	210,873	38	0.02	3	0.00142
Blood donors	14,397,953	2,210	0.02	7	0.00005
Pregnant women	6,110,864	1,303	0.02	8	0.00013
Recipients of blood preparations	65,169	54	0.08	0	0
Military service personnel	68,087	28	0.04	0	0
Prison inmates	447,873	66	0.01	0	0
Examined by clinical indications	902,731	629	0.07	7	0.000775
Examined anonymously	36,237	38	0.10	1	0.00276
Persons in everyday (medical) contact with AIDS patients or serum positive persons	21,028	6	0.029	0	0
Others	1,146,646	273	0.02	14	0.00122

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Clinical Characteristics of HIV-Infected Individuals

907C0560A Moscow SOVETSKAYA MEDITINA
in Russian No 12, Dec 89 (manuscript received 28 Feb 89)
pp 38-40

[Article by A.G. Rakhmanova, V.A. Isakov, A.Yu. Kolmakov, V.K. Prigozhina, V.V. Rusalchuk, and N.V. Badosova, Department of Infectious Diseases (Head, Prof. A.G. Rakhmanova) of the Institute for the Advanced Training of Physicians im. S.M. Kirov (rector, USSR Academy of Medical Sciences corresponding member S.A. Simbirsev); Infectious Diseases Hospital No 30 im S.P. Botkin (Chief Physician Yu.K. Chernyshov)]

[Text] Acquired immunodeficiency syndrome (AIDS) was first detected in 1981 in the USA [4, 10]. At the present time persons suffering from AIDS have been identified in more than 140 countries of the world, including the USSR. The total number of AIDS patients exceeds 130,000 and the mortality rate has reached 50 percent and higher [1, 3, 9]. The rapid growth of the number of infected persons, the high mortality rate, the absence of reliable preventive and therapeutic methods, and the presence of millions of persons infected with the HIV virus in the world make AIDS one of the most important medical-social problems today in the public health sector [6, 7].

In Leningrad serological testing for AIDS has been in progress since 1987. Over 11,000 sera samples from high risk group persons, i.e., drug addicts, homosexuals, venereal disease patients, and persons with multiple sexual relationships, have been tested by immuno-enzyme analysis (IEA) in domestic and imported test systems at the city interdepartmental laboratory. In addition, in accordance with regulatory documents, tests were made on foreign citizens and pregnant women as well as adults and children who were in contact with HIV-infected individuals.

The detection of HIV antibodies in the IEA blood serum tests was followed by immuno-blot confirmation tests. Seropositive reactions to HIV were detected in 32 persons of whom 12 were Soviet citizens and 20 were emigrants from Central African countries. All of the persons were given a detailed clinical-laboratory examination employing puncture biopsy of the liver (11) and examination of their immune status. T-lymphocyte subpopulation was counted in a theophylline test as well as by the Orto diagnostic monoclonal antibodies test according to the instructions of the manufacturer. The serum level of principal class immunoglobulins (Ig) was measured as well as the C3 complement components, transferrin, ceruloplasmin, and orrhomucoid by the Mancini radial immunodiffusion method.

Eighteen HIV-infected persons were diagnosed in the stage of persistent generalized lymphadenopathy (PGL), four were diagnosed as having the AIDS-related complex (ARC), and one person was recorded as a posthumous AIDS case. Nine seropositive persons with no symptoms of the disease at all were considered to be in the virus-carrier state.

The most characteristic sign of early PGL and ARC stages was enlargement of various groups of lymph nodes which usually involved three to four groups. Thus, cervical lymphadenitis was found in 14 persons and axillary lymphadenitis in 13 persons. One-half of the infected persons were found to have enlarged inguinal lymph nodes which was pointed out by other investigators as well [5]. Much rarer were enlarged cervical lymph nodes (in three persons) and cubital nodes (in one person). The palpated lymph nodes were painless and non-adhesive to surrounding tissue, had a dense, elastic consistency and ranged from 1 to 3 cm in size. In ARC the lymphadenopathy was more pronounced both with respect to the number of involved groups of lymph nodes and the number of lesions.

Hepatomegaly was observed in 15 examined persons of whom 11 had PGL and four had ARC. The liver protruded by 1 to 2 cm from under the margin of the right costal arch along the medioclavicular line. It was painless and rather dense. Moderate splenomegaly was detected in two HIV-infected persons with persistent generalized lymphadenopathy.

In addition to lymphadenopathy and hepatomegaly, the persons with ARC exhibited recurrent herpes infection which frequently exacerbates chronic tracheobronchitis. Two individuals had a non-specific lesion of the genitals in the form of a chancreiform pyoderma. Two individuals exhibited facial and neck pyoderma. A disturbance of hepatic protein synthesis was detected. In one-half of the infected persons albumin content (47.8—50.6 percent) and sublimate titer (1.42—1.6 ml) were lowered, and there was an increase in total protein and gamma globulins. The A/G coefficient in one-half the persons was below normal. The detected dysproteinemia was more pronounced in the persons with ARC.

An assay of the basic classes of serum Ig exhibited a tendency toward greater concentration in all of the examined groups in comparison to healthy persons. The greatest differences in Ig content was recorded in patients with ARC. Thus, the IgA and IgG concentration was 1.8 - 2.2 times, and the IgM concentration was 3.2 times higher than those levels in healthy persons. This corresponds to the literature data [2, 8]. The employed non-parametric criteria made it possible to consider the difference in the Ig level in the compared groups to be reliable ($p < 0.05$).

A morphological study of liver punctates exhibited signs of viral lesions of the hepatocytes with a predomination of the mesenchyme-inflammatory reaction.

Investigation of T-cell immunity in the theophylline test of HIV-infected persons indicated significant shifts in the immune status. Thus, the content of theophylline-resistant lymphocytes (Tx helpers) was reduced in virus carriers and persons with PGL and was reliably lower than the norm in persons with ARC ($p < 0.05$). The number of theophylline-sensitive cells (Tc suppressors) remained within the normal range. A calculation of the

Tx/Tc ratio was particularly indicative. That ratio was 3.0 ± 0.3 in healthy persons and was significantly lower in persons with ARC (1.6 ± 0.3) than in persons with PGL (1.9 ± 0.3). In the reaction with monoclonal antibodies the OT4/OT8 ratio of T-lymphocyte subpopulations was reliably lower than the norm in the group with ARC (0.68 ± 0.14 ; $p < 0.05$).

There was a reliable reduction in the complement C3 component in the blood sera of persons with ARC and HIV-infected individuals.

In addition to the clinical and laboratory characteristics of the initial stages of HIV infections, the following is our observation of an AIDS patient:

Gr. G., 29-year-old female became ill in February 1988 at which time she had a sore throat, periodic temperatures up to 39°C with chills and non-productive cough. She was observed over a five-month period at a polyclinic. Her condition was diagnosed as chronic tonsillitis and tracheobronchitis.

Subsequent deterioration in July: She was disturbed by lassitude, non-productive cough, sore throat, and subfebrile temperature. An objective examination showed her condition to be satisfactory and skin was clear. Mucous oral cavities were covered with a whitish deposit. Lymph nodes were not enlarged. Pulse rate was 76 per minute, cardiac tones were clear. Harsh breathing in the lungs, no rales were heard. Blood analysis: Hb 134 g/l, leukocytes $- 3.8 \times 10^9/\text{l}$, p. 13, s. 56, lymphocytes 19, monocytes 3, eosinophils - 10 percent. ESR 56 mm/h. X-rays of the thoracic cavity organs showed signs of bilateral interstitial pneumonia. The patient was hospitalized in connection with her deteriorated condition.

Upon examination at the hospital the patient was undernourished (she had lost 12 kg in five months), skin was dry, cyanosis of ungual phalanges of her hands, acrocytosis. Grey-white deposits on buccal mucosa, peripheral lymph nodes were not enlarged. Pulse rate was 90 per minute, respiration rate 24 per minute. Harsh breathing in the lungs. To the left and under the shoulder blades were non-resonant, moist rales. Percussion demonstrated pulmonary resonance with a box-like tone. Moderate blood leukocytosis with a pronounced stab neutrophil shift, lymphopenia, ESR 69 mm/h. Abrupt reduction in the number of T-lymphocytes with a pronounced disbalance of the principal immuno-regulating cells, OTK4/OKT8 less than 1.0. A differential diagnosis was made between the systemic disease and disseminated candidiasis. The patient received comprehensive therapy comprising detoxification, antibacterial, and immunostimulant treatment. Hormones, bronchodilators and cardiac agents were prescribed for her.

Within a week the patient's condition progressively worsened: incremental acute respiratory and cardio-pulmonary insufficiency developed for which the patient was transferred to an intensive-care ward.

From her medical history G. was known to have had intimate relations with foreigners in 1978, including Africans. In 1974 she was afflicted with viral hepatitis, and has suffered from chronic tonsillitis, chronic pyelonephritis, and herpes infections since 1986.

In view of her clinical and epidemiological data the patient was tested for AIDS. Her blood serum in the immuno-enzyme and immuno-blot tests contained a full spectrum of antibodies against HIV marker proteins.

In a background of progressive respiratory insufficiency the patient expired three days later.

Sections demonstrated diffuse lesions of the lungs assessed as alveolitis, hypoplasia of lung root lymph nodes, and moderate chronic venous congestion in systemic circulation. She was five weeks pregnant. A microscopic examination of the lung tissue revealed *Pneumocystis carinii*. Various coccal flora were detected from bacterial cultures taken from the lungs. The clinical, epidemiological, and morphological data together with the results of specific diagnostics resulted in a diagnosis of AIDS, pulmonary form—pneumocystic pneumonia, disseminated candidiasis of the buccal cavity, upper respiratory tract, bronchi, and esophagus. Concomitant diseases included chronic tonsillitis and pregnancy. Complications: respiratory and cardiovascular insufficiency. The comprehensive clinical symptomatic picture of AIDS in the patient was characterized by a prolonged wave-like fever, weight loss, recurrent disseminated candidiasis of the digestive and respiratory organs, atypical pneumonia with minimal physical manifestations and incremental cardiopulmonary insufficiency.

Thus, one can confirm the incidence of HIV-infection among the population of Leningrad and the presence of infected persons in the risk groups. The identification of HIV-infected individuals should be pursued not only among the risk contingents, but also among hospital patients exhibiting clinical indications.

Conclusions

1. The initial signs of the disease, PGL and ACR, are primarily encountered among HIV-infected individuals identified in Leningrad. In one case only a clinically manifested picture of AIDS was diagnosed postmortem.

2. The PGL stage is characterized by an enlargement mainly of the cervical, axillary, and occipital groups of lymph nodes, and hepatomegaly. ARC is manifested by the involvement of three to four groups of lymph nodes, hepatomegaly, recurrent herpes infection, chronic tracheobronchitis, and pyoderma.

3. The clinical picture of AIDS in the observed female patient was manifested by opportunistic diseases: disseminated candidiasis of the respiratory and digestive organs and malignant pneumocystic pneumonia.

4. Medical personnel must become more alert to HIV-infections, and should conduct AIDS tests for patients exhibiting a similar symptomatic picture for whom no clear diagnosis has been rendered.

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Ethological-pharmacological Analysis of Psychotropic Properties of Phenylpiperazine Derivatives on Experimental Models of Aggressive Behavior

907C0098C Moscow ZHURNAL VYSSHEY NERVNOY DEYATELNOSTI IMENI I. P. PAVLOVA, in Russian Vol 39 No 3, May-Jun 89 pp 564-566

[Article by N. S. Kosenkova, B. G. Butoma and V. P. Poshivalov, deceased, Central Scientific Research Laboratory, Leningrad Medical Institute imeni I. P. Pavlov: "Ethological-pharmacological Analysis of Psychotropic Properties of Phenylpiperazine Derivatives on Models of Aggressive Behavior"]

[Abstract] A comparative study of the effect of phenylpiperazine derivatives (fluprasine (DU 27716) and DU 28412) on maternal aggression of lactating rats and on male aggression after intraperitoneal injection of 2.5-7.5 mg/kg into 250-350 g female rats during 2 weeks

after giving birth was described and discussed. Intraspecies behavior of the females was assessed within 20 minutes after injection of physiological solution or the drug. A strange male was placed in the cage containing a female with a litter the female's behavior toward the male and the mice was assessed for 5 minutes. The effect of the substances on the aggression model of male rats, caused by isolation, was tested by using 14 aggressive male rats (weight 250-300 g), selected from the isolated rats. Within 20 minutes after injection, a standard female from the group was placed into the cage of the isolate and the isolate's behavior was analyzed for 5 minutes. Fluprasine, which is thought to be an agonist of serotonin (S_1 and S_2) receptors, suppressed male aggression to a greater extent than lactating female aggression. Fluprasine eased the protective behavior of the lactating rats and the interspecies socializing involving contacts with the mice somewhat more than in the case of the male rats, without increasing socializing with the strange male. In some phenylpiperazine derivatives on a model of maternal aggression, fluprazine affects aggressive behavior more selectively than does DU 28412. Figure 1; references 4: 3 Russian; 1 Western.

UDC 578.833.21:578.427].08

Isolation of Viruses of Antigen Complexes of California Encephalitis and Bunyamvera (Bunyaviridae, Bunyavirus) From Mosquitoes in Northeastern Asian Continent

907C0130d Moscow VOPROSY VIRUSOLOGII
in Russian Vol 34 No 3, May-Jun 89 (manuscript received 5 Feb 88) pp 333-338

[Article by S. D. Lvov, V. L. Gromashevskiy, Yu. V. Voropanov, V. P. Andreyev, T. M. Skvortsova, Ye. I. Usacheva, G. A. Dmitriev, O. V. Voltsit, A. A. Shilov, A. M. Butenko, A. A. Kuznetsov, N. G. Kondrashina, T. N. Morozova, Ye. A. Gushchina, Ye. A. Bystrova, S. M. Klimenko, N. N. Shchipanov, V. B. Grigoryev, A. D. Avershin and G. V. Bogoyavlenskiy, Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences; Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow]

[Abstract] Experimental data are reported on isolation of bunya viruses from mosquitoes collected in July-August of 1986 in tundra, forest-tundra and northern taiga regions of Kamchatka Oblast and the Chukotsk Autonomous Okrug of the Magadan Oblast. The collection points were within an area extending from 53°N lat to 69°N lat and from 156°E long to 177°E long. In viral studies carried out on 2-day-old mice, seven strains of the California encephalitis complex (Tahyna-like [Tyaginya] strains) were isolated, as were four of the Bunyamvera complex (Batai-like strains); both complexes were found in all geographical areas involved. Virus-neutralizing antibodies were identified in serum specimens of reindeer and among humans inhabiting these territories. No antibodies to the Uukuniemi virus were found. These data resembled the results of analogous studies on the North American continent. It was shown that mosquito-borne viruses of the California encephalitis antigen complex are circulating in the northeast of the Asian continent (as they have been shown to be in northern Europe and North America). Figures 2; references 15: 3 Russian, 12 Western.

Formerly Secret Statistics Published on Tuberculosis in Kazkh SSR

90US0138A Alma-Ata KAZAKHSTANSKAYA PRAVDA
in Russian 12 Oct 89 p 3

[Article by A. Dzhunusbekov, director of the Scientific-Research Institute of Tuberculosis, doctor of medical sciences, professor and G. Khauadamova, senior scientific associate, candidate of medical sciences: "Risk Factors"]

[Text] Just one year ago it was impossible to publish information about the prevalence of tuberculosis in the special scientific medical literature. Such information was kept only in closed departmental compendiums. The mass periodical literature sidestepped this topic since violation of the then existent complete taboo of the subject was

impossible, and appeals for the prevention of tuberculosis were left hanging in the air because of the lack of specifics or persons who could be addressed on the subject. The result was that the public has been uninformed about the actual prevalence of the one of the most dangerous diseases in the republic's territory.

We take advantage of the recently obtained opportunity to remove the cloak of secrecy from these kinds of statistics and invite our readers to give thought to an active prevention of this dire infectious disease. That prevention literally depends upon every one of us. The antitubercular institutions of Kazakhstan now have 54,000 registered patients and 1,600 to 1,800 TB patients die each year. Through the efforts of phthisiologists approximately 12,500 persons are annually cured successfully, although almost the same number of persons are identified as new cases of illnesses of which one third constitute an open form of tuberculosis that is dangerous to those around them. Consequently, the number of afflicted persons and the number of cured patients has been maintained at a constant dynamic equilibrium which has created an intensive epidemiological situation in the republic that has existed for many decades.

Our republic has developed a program for rural social assistance. Plans have been outlined for the installation of gas lines, intensive housing construction, roads, water lines, schools, and hospitals for thirty of the most socially backward rayons. This will make it possible to raise the life quality and cultural level of people and improve their living environs. Implementation of the outlined measures will without doubt positively affect the people's health and make it possible to reduce the tuberculosis morbidity rate.

At the same time it is important that medical prevention receive continued attention. Fluorogram examinations of the thoracic cage can detect the initial forms of tuberculosis as well as lung cancer. Unfortunately, such examinations are not being undertaken everywhere on a massive and systematic scale. Thus, only 61.9 to 64.9 percent of the population in the Alma-Ata, Karagand, Tselinograd oblasts, and the city of Alma-Ata has undergone such examinations.

A frivolous attitude toward one's health entails a heavy cost: Those who did not want to spend a few minutes for an examination often face the prospect of losing years of fully-active life. Inasmuch as the examinations are planned to be implemented at labor collectives, we are counting on the cooperation of the administration and trade union committees. It is not at all difficult to convince workers to take a short break to undergo an examination. Nevertheless, unfortunately, medical personnel are not getting the required support, as indicated by the fact that road teams of our specialists in April and May of this year in the Ural Oblast were refused cooperation by a number of enterprise managers in organizing tuberculosis tests at their collectives.

Children are generally recognized to be the most seriously affected by tuberculosis infections. A significant

measure to prevent the danger of infection was the creation of preschool all-day health groups in kindergartens for youngsters with a high risk of infection, where provision is made for fortified nutrition and preventive medicine. Most important of all is the fact that these children are guarded against contact with infected persons. However, such groups have been opened in only 55 rayons whereas there is a need for them in 116 rayons of the republic. For example, only three out of eleven rayons in the Chimkent Oblast have such groups, and only two out of ten in the Kokchetav Oblast.

Through the use of questionnaires in the city of Guryev we identified the kind of living conditions that exist among families with tuberculosis victims. Less than one-half of the families queried have adequate housing (42.1 percent). The overwhelming majority live in extremely cramped and congested quarters. There are many families in which the living space per person is less than five square meters. This is so in spite of the fact that by law persons afflicted with the open form of tuberculosis must be provided with an additional 10 square meters of housing space.

There were 1,700 tubercular patients last year in the republic who were in need of apartments, but only 740 received them. The housing situation is particularly bad in the Kzyl-Orda and Chimkent oblasts. There has been a drastic reduction of apartments allotted to patients in Alma-Ata. Whereas new housing was provided for 71 tubercular patients in the 1986-1987 period, only 46 obtained housing in 1988.

One more important factor is that families with tuberculosis sufferers have a low average annual income. Only 17.7 percent of the families had incomes over 75 rubles per person, and 15.6 percent were on the edge of poverty with less than 35 rubles per person. Basically these were families with many children. These persons obviously had deficient nutrition. They eat little meat and dairy products. Only 29 percent of the persons ill with tuberculosis have the opportunity of including meat into their diet annually, and 40 percent include milk over the same period.

Even the non-specialist can recognize that it is difficult to prevent illness with this kind of nutrition. On more than one occasion the Kazakh Scientific-Research Institute of Tuberculosis and the republic's ministry of health have suggested that persons afflicted with tuberculosis be assigned to specially ordered dietary schedules. This has been done in Guryev, but the problem is far from being resolved as a whole.

There is no need to prove the curative properties of koumis and shubat. They are produced in the republic at a rate of only 5.5 tons. This would hardly be enough even for tuberculosis patients. It is not hard to imagine how much of that product is provided to them... Koumis [mare's milk] and shubat are as rare in our treatment

facilities as are overseas oranges which, by the way, do not contain more vitamin C than our traditional national beverages.

The Kamen Plateau sanatorium near Alma-Ata was famous at one time for its good food. It had its own subsidiary farm and its patients got sufficient amounts of koumis and fruits. Now this facility has declined. Its lands have been taken away and almost no koumis is available.

The social roots of tuberculosis are also to be found in antisocial behavior. Up to 12 percent of first-time tuberculosis patients are alcoholics and drug addicts. A significant number of them came from corrective-labor camps of the MVD. These persons exhibit an epidemiologically dangerous form of tuberculosis such as fibrocavernous tuberculosis which is encountered eight times more frequently. They frequently do not have families and eat at restaurants thereby spreading the infection. Such persons are difficult to treat since they arbitrarily leave the hospital and violate the regimens prescribed for them. Special departments must be organized in concert with the MVD to treat this contingent in all oblasts.

The republic's health sector and veterinary services are confronted with a most serious problem: the prevention of human infection by tubercular cattle. Sick cattle is the reason for the spread of the so-called bovine tuberculosis, especially among cattle breeders. That form is a more grave type of tuberculosis and is more difficult to treat. It is essential that farms are sanitized and that all tubercular-infected animals are slaughtered. This requirement as well as the whole complex of sanitation and hygiene measures is being quite poorly implemented.

By the beginning of the current year there were 442 farms with particularly unfavorable conditions within the republic's State Agroindustrial Committee system where there were more 154,000 tuberculosis-infected animals. There were frequent cases in the North Kazakhstan, Kustanay, Kokchetav, and other oblasts where the farms were delivering infected meat and dairy products to the state without informing authorities about the true status of matters.

The material base of phthisiatric services has been extremely neglected. In spite of four governmental decrees, the gorispolkom in Alma-Ata has not built a single standard building. All of the antituberculosis institutions are located in adobe-straw buildings with extensions for laboratories and X-ray equipment. Conditions do not exist for hospital treatment, and the clinic of our institute has been forced to admit up to 40 percent of the capital's residents thereby limiting its hospital facilities to patients from the remote oblasts.

The struggle against tuberculosis and its prevention require the combined efforts of the offices of the public health sector, the therapeutic institutions, and the sanitation-epidemiological stations as well as the persistent attention and competent handling of the soviets and a concise execution of the adopted social programs.

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